hand. Data of every degree of untrustworthiness are given in the text, but the student is debarred from verifying the figures or referring to the original for further information as to their meaning; exact references should have been given in every case. Even in the bibliography we would suggest that such citations as "Produktion and consum. of timbre in forein countries. (blue book)," and "Statesman's yearbook, Statist. Abstracts (mit statistischen Tabellen)," are hardly clear.

Finally, while we approve the use of graphic methods, we wish that Dr. Reyer would lay to heart the golden instruction in the Board of Education's "Syllabus of Practical Mathematics":—"In all the work on squared paper a candidate should be made to understand that an exercise is not completed until the scales and the names of the plotted quantities are clearly indicated on the paper."

OUR BOOK SHELF.

Etude sur la Vallée Lorraine de la Meuse. By J. Vidal de la Blache. Pp. 190; with figures and folding maps. (Paris: Armand Colin, 1908.) Price 4 francs.

CAPTAIN VIDAL DE LA BLACHE publishes in this book a memoir on the development of the valley of the Meuse, a subject that has engaged the attention of several previous authors, including M. Cornet and Prof. W. M. Davis. He points out the striking character of this long valley, without any important tributaries, yet carved out in past times by a river more powerful than that which now occupies its bed. He explains its independence as regards the Paris basin by the fact that its waters were led northward into an old sea covering the Ardennes before the westward slope of the Seine system had been determined. The Meuse was originally joined by the Moselle at Pagny-sur-Meuse, through the now deserted gap between that town and Toul, and thus had its primary sources in the Vosges. The author relies much on the distribution of pebbles from the Vosges in the older alluvium of the valley. He denies that the river is decadent, though since the capture of the Moselle it has lost much of its erosive force; it has still an important flow, owing to the supplies gathered from the rains and stored in the deep and saturated gravels of its bed.

The second part of the book relates to the influence of the valley on the occupations of its inhabitants. The population has become reduced (p. 143) to the lowest level compatible with agricultural production, and labourers are even invited from other areas. Hence there is no surplus of workers who might emigrate from it to the neighbouring mining country. The latter has become occupied by Belgians and Italians, and the contrast of peoples and modes of living has become acute. The typical farmstead on the Meuse is figured on p. 151, where we see dwelling-house, barn, and stable under one great roof, as in Friesland; three separate entries, however, are here provided in place of the huge doorway common in the Low Countries. The history of roads along this natural highway or across it is fairly given, but the author stops short of the last great incident of the valley, when the French armies were led northward along it, as if drawn fatally to the Ardennes, while the Bavarians, representing the ancient torrents from the Vosges, poured down after them to Mouzon and Sedan. As Captain de la Blache observes (p. 177), the mineral wealth of Lorraine has led to a convergence of canals and railways independent of the direction of the Meuse; it is as if this valley "avait subi aussi une capture économique."

G. A. J. C.

Chemical Reagents, their Purity and Tests. A New and Improved Text based on the Latest Edition of Krauch's "Die Prüfung der chemischen Reagentien auf Reinheit." By E. Merck. Translated by H. Schenck. Pp. vii+250. (London: A. Constable and Co., Ltd., 1907.) Price 6*s.* net.

EVERY chemist, whether engaged in analytical work or not, will welcome the translation of Krauch's manual into English, for the growing refinements introduced into all chemical operations render a full knowledge of the purity of laboratory reagents increasingly important.

In the present volume the properties of common materials, both inorganic and organic, are given in alphabetical order, the nature of the impurities indicated, and the tests, both qualitative and quantitative, described. It thus becomes a very simple matter to ascertain the purity of any substance, and, as there are something like 250 enumerated, it will be seen that the range is fairly comprehensive. There is little that calls for comment or criticism. The descriptions of the impurities and tests, though short, are usually sufficient for the purpose, not the least valuable part being the references to original papers containing details of the processes not found in the text.

The original of Krauch's manual appeared in German in 1888, and passed through several editions, the above translation being made from a revised edition prepared by E. Merck in 1905. The names of the joint authors are a sufficient guarantee of the trustworthiness of the information, and the translation is all that could be desired. Whilst strongly recommending the book we would direct attention to a few omissions. There is no mention of hydrazine, formaldehyde, toluene, or titanium salts, no quantitative method given for estimating solutions of hydrogen sulphide and ammonium sulphide, and nothing is said about metallic lead, magnesium, and aluminium, all of which may be regarded as not uncommon reagents.

J. B. C.

Notre Flotte aérienne. By Wilfrid de Fonvielle and Georges Besançon. Pp. 234. (Paris: Gauthier-Villars, 1908.) Price 6.50 francs.

THIS little book forms a *résumé* of the steps taken to accomplish the navigation of the air so far as we have at present got. Ordinary ballooning is left out of the question, and the bulk of the book is devoted to the development of the dirigible, especially in France.

Soon after the ascent of the first balloon (1783), Lieutenant Meusnier wrote a memoir discussing the principles on which a dirigible balloon might be constructed. This was remarkable as foreshadowing the airship of to-day, especially as regards the "ballonet," or method by which the envelope can be kept rigid by the internal pressure of air. But at that period no engines existed by which the necessary power for propulsion could be obtained. Later on, when the steam engine had become developed, Giffard built his machine, the prototype of the modern vessel, and made trials in Paris in 1852. Little by little further improvements were made, the siege of Paris especially directing attention to the importance which might attach to such an apparatus in military operations.

Then came the electrically propelled balloons of MM. Tissandier, and *La France*, which latter proved to be the first machine to make long journeys successfully.

Finally we come to the "machines a explosion," or balloons propelled by gas engines. Paul Haenlein in 1865 was the pioneer of this type, although he seems to have had no practical success. The German machines of Woelfert, Schwartz, and the first Zeppelin are in turn described, though each of them proved failures. The various vessels of Santos Dumont next claim attention, especially his much-lauded trip round the Eiffel Tower. More failures and catastrophes followed with Rose, Severo, and De Bradsky, and then came the successful essays of the Lebaudys. The history of this type of airship is fully gone into, from the first trials up to the unfortunate escape of the *Patrie*.

Then follow descriptions of the other French dirigibles, the *Ville de Paris*, and that of Count de la Vaulx.

The modern airships of other countries are disposed of in a few pages. The Zeppelin No. 3 is shortly described, but its better-known successor, which has since made its *début* and taken its *congé*, is referred to in the final pages of the book. Having described the Polar explorations by balloon at some length, the authors give a chapter on aëroplanes. The latter can hardly be called up to date, since progress has been so rapid during the last year or two. It is almost amusing to read of M. Farman's record performance of remaining in the air for 52⅗ seconds when to-day we think nothing of Mr. Wright flying for more than an hour with a passenger. In these circumstances of kaleidoscopic changes it seems impossible to bring out a book on aëronautics which shall be really up-to-date, but the one before us is a good little history which is fairly trustworthy, though it is not detailed enough to be classed as a technical text-book.

An English Holiday with Car and Camera. By James John Hissey. Pp. xviii+426; with 28 full-page illustrations and a map of the route. (London: Macmillan and Co., Ltd., 1908.) Price 10*s*. net.

IT was scarcely necessary for Mr. Hissey to tell us, as he does in his preface, that he travels purely for pleasure and "in search of the picturesque." Those readers who know the author's many pleasant, gossipy books about English by-ways have long been aware, from the optimistic way in which rural England is described, that Mr. Hissey loves exploring his native land. This time the journey taken by the author and his wife was confined to motoring in the country south of a line joining the Wash to the Bristol Channel. The account of the wanderings, with its many glimpses of the home-life of the country people, and the excellent illustrations, combine to make a very interesting volume.

Pearls and Parasites. By A. E. Shipley, F.R.S. Pp. xv+232; with illustrations. (London: John Murray, 1908.) Price 7*s*. 6*d*. net.

THE title of Mr. Shipley's book scarcely serves to indicate the general character of the contents. The volume contains nine essays, which, with one exception, deal with problems of economic zoology. The subjects introduced vary considerably among themselves, as the following titles show:—Pearls and Parasites; the Depths of the Sea; British Sea-fisheries; Zebras, Horses, and Hybrids; Pasteur; Malaria; "Infinite Torment of Flies"; and the Danger of Flies. The concluding essay is an inquiry into the aims and finance of Cambridge University. Most of the essays have appeared previously in periodicals, and have been read by many people interested in science. The subjects discussed are sufficiently important to attract the scientific as well as the general reader.

Architectural Education. By Wilfrid I. Travers. Pp. vii+119. (London: Harrison, Jehring and Co., 1908.) Price 4*s*. net.

THE subtitle of this book indicates its character with fair precision; it runs:—"A history of the past and some criticisms of the present system, upon which are founded some suggestions for the future, with particular reference to the position of the universities." Mr. Travers has collected much information as to the courses of training for architects and the syllabuses of the examinations conducted by the Royal Institute of British Architects and many universities, and also offers useful suggestions for their improvement. Many of the schemes of work here tabulated appear to give little prominence to the training in the principles of science which are necessary for an architect to ensure successful work.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

A Suggested Explanation of the High Velocities of Gases observed on the Solar Surface.

THE important discovery by Prof. Hale of the Zeeman effect in sun-spot spectra proves the presence of extensive areas on the solar surface in which ions of one kind largely preponderate. This suggests the solution of one great difficulty which has blocked the way in the attempts that have been made to explain the very high velocities which are not unfrequently observed near the solar surface by spectroscopic and other means. For there is a limit to the velocity of a gas impelled by pressure only, this being the velocity with which it streams from a high pressure into a vacuum, and we may put this limiting velocity to be equal to that of propagation of sound in the gas. Observation shows that the highest velocities observed on the solar surface are about 200 times as great as the velocity of sound in hydrogen at the temperature of freezing water.

If, then, these masses of moving matter are impelled by pressure only, the number expressing their absolute temperature divided by the density must be 40,000 times greater than the corresponding number in the case of hydrogen at 0° C. Taking the absolute temperature of the sun to be forty times as great as that of freezing water (which cannot be far from the truth), the observed velocities would become consistent with our supposition of pressure-motion only if the density of the gas were a thousand times less than that of hydrogen. This brings us down to the mass of the negative electron. As, however, spectroscopic evidence indicates the motion of ponderable matter (principally, if not solely, composed of hydrogen), we must assume that gases are entangled in the rush of electrons, but not to a sufficient degree to alter the average density materially. In the case of matter in which one kind of electrons preponderate, electric forces may, of course, increase the velocities almost to any extent, but the close agreement of the observed high velocities with the limiting velocity in a gas, having a density equal to the thousandth part of that of hydrogen, and being at a temperature agreeing, so far as we can tell, with that of the solar surface, is highly suggestive. I conclude, therefore, that if the observed velocities are real—and there is good ground for believing them to be so—the prominences and other appearances in which velocities of more than about 10 kilometres a second are observed are composed to a preponderating extent of electrons in which gases are entangled to a sufficient degree to give the spectroscopic test, but not sufficiently to alter materially the average density.

In conclusion, I should like to urge a word of caution